

REMARKS

By the present Amendment, claims 1-10 are cancelled and claims 11-30 are added. This leaves claims 11-28 pending in the application, with claim 11 being independent.

Objection to Drawings

The drawings are objected to under 37 C.F.R. §184(p)(5) for the specification failing to mention “36” included in Fig. 2. This objection is obviated by adding “36” to the specification.

Substitute Specification

The specification is revised to avoid the objections raised in the Office Action and to eliminate grammatical and idiomatic errors in the originally presented specification. The number and nature of the changes made in the specification would render it difficult to consider the case and to arrange the papers for printing or copying. Thus, the substitute specification will facilitate processing of the application. The substitute specification includes no “new matter”. Pursuant to M.P.E.P. § 608.01(q), voluntarily filed, substitute specifications under these circumstances should normally be accepted. A marked-up copy of the original specification is appended hereto.

Claim Objections and Rejections Under 35 U.S.C. § 112, Second Paragraph

Original claims 1-10 stand objected to and rejected under 35 U.S.C. § 112, second paragraph, as being informal and indefinite. By the present Amendment, the originally filed claims have been rewritten to avoid the language alleged to be informal or indefinite in the Office Action. All language of the presently pending claims is now believed to be formal and definite.

Thus, the pending claims are definite and comply with 35 U.S.C. § 112.

Rejections Under 35 U.S.C. §§102 and 103

Claim 11 covers a method for producing a piston accumulator. The method comprises mounting a piston 12 in an accumulator housing 10 for movement along a longitudinal axis 48 of the housing with the piston separating housing interior into two working chambers 16 and 18 between first and second longitudinal ends of the housing. At least a first shoulder 38 is provided in the housing interior adjacent to but spaced from the first housing longitudinal end. A first cover component 20 is inserted at least partially within the housing through the first longitudinal end when open until its inner surface portion 36 engages the first shoulder 38 preventing further insertion of the first cover component. A first end portion of the housing between the first shoulder and the first longitudinal end is deformed at an acute angle relative to the longitudinal axis against an axial outer circumferential contact surface extending at a corresponding acute angle relative to the longitudinal axis and about an axial outer surface portion of the first cover component to secure the first cover component in the housing with the first cover component sealing the first longitudinal end of the housing closed. The second longitudinal end of the housing is sealed closed.

By performing the method in this manner, the piston accumulator is formed and sealed in a reliable operation that is simple and inexpensive to perform. The deforming of the end portion is particularly simplified by the accumulator housing deformation being at a free end and against an exposed axial surface of the cover component to simplify the operation and the tooling necessary for this deformation.

Claim 1 stands rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent No. 2,734,531 to Bizak. The Bizak patent is cited for as disclosing a piston accumulator having an

accumulator housing and a separating piston 48 displaceable in the housing and separating the housing into two chambers. The Bizak accumulator housing is allegedly sealed on its end sides by cover components 15 and 28 that are fastened to the accumulator by a free longitudinal edge 10 and threads 34 on that longitudinal edge.

Claims 1 and 3 stand rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent No. 6,460,571 to Rajabi. The Rajabi patent is cited for a piston accumulator having an accumulator housing 20, a separating piston 26 and cover components 14 and 16 sealing the ends of the accumulator housing. Each cover is allegedly fastened to the accumulator housing by a free longitudinal edge of the housing undergoing a positioning movement onto the cover component via die 52. Die 52 is allegedly a shaping tool providing a positioning bevel securing cover component 16 to the accumulator housing.

Claims 2, 6 and 10 stand rejected under 35 U.S.C. §103 as being unpatentable over the Rajabi patent in view of EP 1,128,073 to Audureau. The Audureau EP patent is cited for a cover component 2 inserted into an accumulator housing against a stop 25, the cover component being retained in its end position by the clamping force of the free longitudinal edge 24. In support of the rejection, it is alleged that it would be obvious to use the Audureau stop in the Rajabi accumulator. Relative to claim 6, the Audureau EP patent is cited for a cover component having a bevel against which the longitudinal edge rests in a secured state. In support of this rejection of claim 6, it is contended that it would be obvious to provide the Audureau bevel on the Rajabi accumulator. Relative to claim 10, it is alleged to be obvious to modify the Rajabi accumulator to provide a cover component having a height which is at least twice as great as that of the free longitudinal edge, as allegedly disclosed in the Audureau EP patent.

Claims 4, 5, 8 and 9 stand rejected under 35 U.S.C. §103 as being unpatentable over the Rajabi patent in view of U.S. Patent No. 4,644,976 to Peter. The Peter patent is cited for an accumulator having a wall thickness of its longitudinal ends that is reduced relative to the remainder of the housing, and a transition between the different wall thicknesses forming a stop. In support of the rejection, it is alleged that it would be obvious to form the Rajabi accumulator with a stop formed by different thicknesses adjacent the longitudinal edge as allegedly shown in the Peter patent. Relative to claim 5, it is alleged that the Peter patent teaches an insertion bevel that would be obvious to add to the Rajabi cover. Relative to claim 8, the Rajabi positioning tube 48 is cited for disclosing enclosing the longitudinal edge of the accumulator housing, while the Peter patent is alleged to disclose a cover 5 introduced into the accumulator housing to a stop located at a transition between different wall thicknesses of the accumulator housing which would allegedly be obvious to add to the Rajabi accumulator. Relative to claim 9, the Peter patent is again cited for the insertion bevel and transition point between different wall thicknesses which allegedly would be obvious to add to the Rajabi accumulator.

Claim 7 stands rejected under 35 U.S.C. §103 as being unpatentable over the Rajabi patent in view of U.S. Patent No. 5,115,663 to Ando. The Rajabi patent is cited for disclosing a shaping tool 52 securing cover components 14 and 16 by acting on the free longitudinal edge of accumulator housing 12. The Ando patent is cited for allegedly forming a metallic article by two shaping tools with one shaping tool located at each end of the article. In support of the rejection, it is alleged that it would be obvious to modify the Rajabi accumulator to include shaping tools for securing both cover components to the accumulator housing simultaneously.

Claim 11 is patentably distinguishable over the Bizak patent by the cover component being trapped within the housing between the shoulder in the interior of the housing and the free end portion of the housing that is deformed or bent over the axial contact surface of the cover component. In contrast, the Bizak end caps 18 and 28 are coupled to the exterior of cylindrical outer shell 10 by threads 11 and 12 on the exterior of the outer shell and the mating internal threads on the end caps. Thus, the Bizak patent does not disclose or render obvious the insertion and deforming steps of claim 11.

Claim 11 is also patentable distinguishable over the Rajabi patent considered alone or in any alleged obvious combination with the Audureau patent, Peter patent and/or Ando patent by the deformation of the first end portion at an acute angle relative to the longitudinal axis against an axial outer circumferential contact surface extending at a correspondingly acute angle and about an outer axial surface of the first cover component. None of these patents deform against such outer axial circumferential surface that is axially exposed on the cover component to facilitate its production by a simple axially movable forming tool, rather than the complex structure of the radially movable tools required in the formation of the devices of the cited patents, and deform a free end of the housing.

The Rajabi patent has end caps 14 and 16 each with a laterally open circumferential groove 38 (Fig. 5) spaced from its axial ends 39, 40 (column 3, lines 47-50). Thus, the Rajabi patent requires a relatively complex forming device that has to be formed in multiple, relatively movable parts that are moved radially inwardly and outwardly, as illustrated in Fig. 7 and 8, and not by a forming tool that is moved merely axially. Such differences are required by the claimed surface engaged by the deformed portion being an axial outer circumferential surface of the cover

component. In contrast, the engaged surface of the Rajabi end cap is not an axial outer surface thereof.

The Audureau patent discloses a similar arrangement for securing end 2 to cylindrical member 10 by application of a radial force to deform a portion of the cylinder 10 into a laterally open groove 22 in the end member 2. The groove 22 or 22' can be angular, as illustrated in Fig. 1, or arcuate, as illustrated in Fig. 2. In each case, the groove is spaced and covered by portions of the end cap located outwardly of the groove such that no surface of the groove forms an axial outer contact surface, as recited in claim 11.

The Peter patent, being cited solely for the use of the reduced wall thickness at the longitudinal end and the formation of a stop, does not cure these deficiencies discussed above relative the Rajabi and Audureau patents.

The Ando patent is cited for the use of shaping tools 36a and 36b that allegedly are on the opposite ends of the article. The Ando dies 36a and 36b form a pipe 100 into a crank shaft 200 by first being deformed to the pipe form 150 by operation of the die 102 illustrated in Fig. 5. The pipe form 150 is then placed in apparatus 10 where it is put in dies 36a and 36b for being pressed downwardly by the presser surface 64a of presser punch 64, which, as illustrated in Fig. 2, is located at the center section and not at the longitudinal ends of the pipe form 150. Thus, the Ando patent does not disclose or render obvious the use of two shaping tools operating on the ends of a cylindrical article. It also does not disclose the insertion and deforming steps of claim 11.

Since none of the patents cited and applied against the original claims, nor any of the other cited patents, disclose or render obvious the claimed deforming of the first end portion

against an axial outer circumferential contact surface about an axial outer surface portion of a cover component, particularly at the claimed acute angles, claim 11 is patentably distinguishable over the cited patents.

Claims 12-28 being dependent upon claim 11, are also allowable for the above reasons. Moreover, these dependent claims recite additional features further distinguishing them over the cited patents.

Claim 12 is further distinguishable by the end edge of the first longitudinal end being deformed to be substantially flush with the outer surface portion. No such flush arrangement appears to be disclosed in the cited patents, particularly Rajabi and Audureau patents.

Claim 13 is further distinguishable by the projection extending axially from the outer surface portion of the first cover component. The Rajabi has no axial component. The Audureau has an axial projection, but not in combination with deforming against the axial outer circumferential contact surface, as claimed.

Claim 14 is further distinguishable by the outer cover component tapering along the contact surface, which is an outer axial surface. No such tapering surface of the cited patents is axial and outer, as claimed.

Claim 15 is further distinguishable by the deforming being formed by axially forcing a first shaping tool against and over the first longitudinal edge with a positioning bevel engaging the first end portion. None of the cited patents disclose or render obvious this deformation by the claimed axial forcing of the shaping tool. As noted above, the Rajabi patent discloses a radially moving tool. While the Ando patent discloses axially movable dies 36a and 36b, such dies do not deform ends of a housing, as claimed, for the reasons discussed above.

Claim 16 is further distinguishable by the reduced wall thickness and the transition forming the shoulder within the overall claimed combination.

Claim 17 is further distinguishable by the insertion bevel 50 extending from the free end edge of the housing. Relative to the insertion bevel, the Peter patent is cited. However, the same structure is relied upon in the Peter patent for both the stop and the insertion bevel, resulting in an improper double reading of the same structure on two different simultaneously claimed parts. Moreover, such alleged bevel in the Peter patent is not at a free end edge of the housing but is spaced from the free end edge so as not to satisfy the limitations of claim 17.

Claim 18 is further distinguishable by the sealing of the second longitudinal end in the same manner as the first longitudinal end. Such sealing of the second longitudinal end is thus distinguishable by the features of claim 11 being also applied to the second end of the housing.

Claim 19 is further distinguishable by the second end being formed by an axially movable shaping tool. As noted above, none of the cited patents discloses such second axial shaping tool.

Claim 20 is further distinguishable for the same reasons advanced above relative to claim 18.

Claims 21 and 22 are further distinguishable by the first and second end portions being simultaneously deformed. No such simultaneous deformation of end portions is disclosed or rendered obvious by the cited patents.

Claim 23 is further distinguishable by use of a position tool with a feed bevel. As noted above, the Peter patent does not disclose or render obvious this feature.

Claim 24 is further distinguishable in the guiding of the first cover component by an insertion bevel at a free end edge of the first longitudinal edge portion. As noted above, the Peter

patent relied upon for the feature does not have an insertion bevel, particularly in combination with a stop and located at a free end edge.

Claims 25 and 26 are further distinguishable by the relative heights of the cover component or components relative to the deformed sections of the housing.


Claim 27 and 28 are further distinguishable by the deformed section or sections being at an obtuse angle.

In view of the foregoing, claims 11-30 are allowable. Prompt and favorable action is solicited.

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Appended hereto is an Information Disclosure Statement citing a recently issued patent.

Respectfully submitted,



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Dated: August 4, 2008